Horn Fly
(*Haematobia irritans* L.)

General Information

The horn fly (Fig. 1) is considered one of the most important pests of pasture cattle. These flies spend most of their adult life on the body of their cattle host. Horn flies have long bayonet-type mouthparts called a proboscis, which contain rasping teeth used to tear through the skin of cattle causing blood to pool at the skin surface. Both sexes of the horn fly feed on blood. Horn flies take 20-30 small blood meals from their host throughout the day. It is not uncommon for cattle to harbor over a thousand horn flies on a single animal. Imagine the irritation associated with tens of thousands of painful bites per day!

Figure 1: Horn fly. Photo by David Theuret, UC Riverside.

Prior to their introduction into North America in the late 1800's, horn flies were common on cattle in Europe where they were noted to cluster at the base of the horns; giving them their common name. In North America, horn flies are most commonly seen clustered along the back of cattle, but will move in masse to cluster along the sides and belly of cattle on sunny days when daytime temperature is high (Fig. 2). Horn flies peak during midsummer in cooler northern climates, while in hotter southern regions of North America they peak in early and late summer.

Identification and Life History

While both horn flies and stable flies have a forward facing proboscis which they use to bite their animal host, horn flies are about half the size (3-5 mm in body length) of stable flies. Additionally, the habits of these two fly species are very different. Because horn flies must take many small blood meals each day, they rarely leave their cattle host. The presence of numerous flies clustered on the back and/or sides of cattle is diagnostic for this fly species. When disturbed, horn flies will fly from the animal only briefly and then immediately return to the same animal or to another very nearby animal. Horn flies bite the host with their head oriented downward and wings moderately spread to form a "V" shape. In contrast, stable flies are typically seen biting cattle on the lower legs, and when noted elsewhere on the body, they will not be clustered in large numbers. Furthermore, stable flies generally bite with their head oriented upward. Both flies have painful bites causing cattle to exhibit defensive behaviors to dislodge the biting flies. Behaviors such as tail flicking, head tossing, and leg stamping are typical cattle responses to biting flies. The rate at which cattle exhibit these defensive behaviors is related to the number of flies biting the

animal, with increasing numbers of biting flies resulting in an increasing rate of defensive behaviors by the afflicted cattle.

Figure 2: Horn flies resting and feeding on the side of a cow. Photo by Alec Gerry, UC Riverside.

Gravid female horn flies will leave their host temporarily to lay eggs in freshly excreted cattle feces. Females can lay 300-400 eggs over a lifetime with 20-30 eggs typically deposited in a single cowpat. After hatching, immature horn flies develop best in undisturbed cowpats, which helps to explain their relative absence on dairies where animals are not kept on pasture. All flies undergo complete metamorphosis with egg, larva, pupa, and adult stages in their development. Larvae respond negatively to light and will burrow into the cowpat in which they are developing. Larvae transform into a pupa within the cowpat. The pupa develops within a puparium, which is the hardened outer skeleton ("skin") of the last larval instar. Within the puparium, the pupa transforms into an adult fly. The rate of fly development is dependent upon external temperatures; under optimal summertime conditions, horn flies can complete their development from egg to adult in as little as 9-10 days. As winter approaches and temperatures cool, horn flies in the pupal stage may enter a diapause phase and delay hatching until warmer temperatures return in the spring.

Damage

When horn fly numbers are high, their painful bites can result in reduced animal weight gains and poor feed conversion efficiency. If milking cows are maintained on pasture, it can be assumed that high numbers of horn flies may similarly reduce milk production. These losses are the result of reduced grazing time and higher metabolic activity associated with increases in fly defensive behaviors. Horn fly control efforts have been shown to increase the average daily growth rate of calves and yearling cattle by 12% or more. Horn fly bites may also result in hide damage and reduced leather quality. The overall economic loss to North American livestock producers due to horn flies is estimated to be over $730 million annually.

Horn flies can be found occasionally on horses in the vicinity of pasture cattle, but the low number of flies typically found on horses in these situations is unlikely to cause much damage to the horse. However, horn fly bites have been known to elicit an inflammation response in horses with open sores that may result in secondary infection. Horn flies are not known to reproduce efficiently in horse dung.

Integrated Pest Management

Monitoring: In any pest management approach, pest population information guides management decisions such as when and how to control the pest. Pest population abundance must be regularly assessed or monitored so that changes in abundance over time can be readily determined. Pest monitoring methods typically provide a relative assessment of the pest population rather than an actual count of the number of pests in a given area. For this reason, it is important to use the same monitoring method consistently so that direct measurements can be made between different assessment periods. Monitoring results should be recorded and kept for several years in order to evaluate seasonal and long-term trends in pest population abundance. Understanding these trends is important to develop a proactive pest management program.

Monitoring horn fly abundance is typically accomplished by counting the number of flies resting on cattle. Count flies on 5-10 animals to provide an estimate of fly abundance on the herd. The best time to monitor horn fly abundance is during early to mid morning when temperatures are still cool and horn flies will be clustered along the back of their cattle hosts. Horn fly abundance is determined by viewing a single animal from one side and counting the number of flies that are visible on the back and side of the animal; the same animal should then be quickly viewed from the opposite side with the number of flies on that side similarly counted. Counts from both sides are then combined into a single fly count for the animal. Cattle must be viewed from both sides because flies will often cluster on one side or the other in considerably greater numbers in response to direct sunlight. When horn fly numbers are high (more than a few hundred), the number of flies can be estimated by counting flies in groups of approximately 50 or 100 in order to reduce the time required for completing a single animal count. Relative horn fly abundance may also be determined by assessing the frequency of cattle behaviors that temporarily dislodge the flies. Cattle exhibiting more than a few head tosses and tail flicks each minute are likely to have moderate to high numbers of horn flies. Cattle will attempt to reduce horn fly biting on the belly by kicking dirt onto the belly, by lying down, or by wading into water.

Management: Because adult horn flies must remain in continual contact with cattle, this is the life stage that is most easily targeted for control. As horn fly numbers begin to increase, insecticides can be applied to animals either as on-animal sprays, pour-ons, or in self-treatment devices such as back rubbers and dust bags. Insecticide applications should occur every 2-4 weeks through the peak activity season. Insecticide impregnated ear tags have provided effective control for over 30 years, but overuse of ear tags during this time has resulted in significant resistance to many available insecticides. For cattle fed supplemental feed rations, these can be formulated with insect growth regulators (IGRs) that pass through the cattle gut to kill immature flies developing in fresh cattle feces. With any insecticide it is important, and legally necessary, to follow label directions regarding site of application, dilution, and application frequency. Products applied to animals for horn fly control typically have a long residual life and are often formulated to spread through the cattle hair coat along with body oils. Product life can be reduced by rain or by cattle access to ponds or streams resulting in removal of applied insecticides.

To control small numbers of horn flies on horses (Fig. 3), use a spot application or insecticide-treated wipe to treat the site where horn flies are resting and biting. Control efforts directed at horn flies on nearby cattle will provide long-term relief to horses.

Figure 3: Horn flies on horse maintained on pasture near cattle. Photo by Alec Gerry, UC Riverside.

Unfortunately, because of the reliance on pesticides to control adult horn flies, many populations of these flies have been selected for resistance to one or more pesticides marketed for their control. For this reason, it is important to limit horn fly management efforts using insecticides to periods of the year when horn fly populations are normally increasing toward peak abundance and to regularly alternate among insecticides with active ingredients representing a different chemical class (different IRAC code).

Recently, researchers have been experimenting with non-insecticidal options for horn fly management. Walk-through vacuum systems have shown promise for horn fly management. In these systems, cattle walk through a partially enclosed box and flies are dislodged from the body and collected within a screened area by the action of a strong vacuum. Research on insect repellents applied to cattle is also showing promise. Unlike insecticides, repellents are not intended to kill flies but rather to drive them from protected animals. Because horn flies are unable to survive off their host for more than a very brief period of time, repellents may kill flies by preventing them from acquiring a blood meal. With repellents affecting complex insect behaviors, it might be expected that selection for horn fly resistance to these repellents will be slow.

Where pasture size is limited, management may be achieved by mechanical or manual disruption of manure pats to reduce suitable horn fly development sites. Manure pats should be raked through to encourage rapid drying of manure and to expose developing fly larvae to predatory insects or hungry birds. Manure that dries within a few days will prevent development of horn flies.

References for more information

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